

REMARKS

In the Office Action, the Examiner rejected claims 1-36. Applicants respectfully assert that these claims, as originally filed, are patentable and in condition for allowance. Reconsideration and allowance of all pending claims are requested.

Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 1, 2, 9-13, 16-18, 21, 27-30, 34 and 35 under 35 U.S.C. § 103(a) as being unpatentable over Iyriboz et al. (U.S. Patent No. 6,369,812 B1) in view of Fabian (U.S. Patent No. 5,195,122). The Examiner also rejected claims 3-8, 14, 15, 19, 20, 22-26, 31-33 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Iyriboz et al. and Fabian in view of Deckman et al. (U.S. Patent No. 4,891,829). Applicants respectfully traverse these rejections.

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985).

The Iyriboz et al. reference, which discloses an interactive graphical rendering device, and the Fabian reference, which discloses a method for marking radiographic film, never mention the determination of whether a projection area falls within a detector framework or boundaries as disclosed by the present application. In further contrast, neither reference discloses an asymmetrical projection upon an image plane. Therefore, as

discussed below, Applicants respectfully submit that the subject matter of independent claims 1, 11, 21 and 30, as well as their respective dependent claims, is patentable over the references cited by the Examiner. Accordingly, Applicants request withdrawal of the Examiner's rejections and allowance of claims 1-36.

Omitted Features of Independent Claim 1

Independent claim 1 recites a method for cropping an *asymmetrical* digital image. The method includes steps for identifying a projection of a radiation beam in an image plane and processing, *on the basis of* the identified projection, image data for a *portion of* a digital detector. Further, the claim explicitly states the projection identified is asymmetrical with respect to an axis of the image plane.

The Examiner rejected claim 1 based upon the Iyriboz et al. and Fabian references. The Examiner contends that the Iyriboz et al. reference discloses a medical diagnostic system that provides for cropping an asymmetrical digital image. The Examiner further contends that the reference discloses steps for such asymmetric cropping that include identification of a projection of a radiation beam in an image plane and processing image data for a portion of a digital detector based upon the identified projection. The Examiner also relies upon the Fabian reference, which the Examiner believes to disclose a projection of a radiation beam in an image plane that is asymmetrical with respect to an axis of the image plane. However, each of these assertions is based upon mistaken characterizations of passages from the cited references.

Teachings of the Iyriboz et al. reference

The Iyriboz et al. reference is primarily concerned with converting two-dimensional images, such as those produced by medical diagnostic equipment, into three-dimensional, interactive presentations. Column 1, lines 10-17. The disclosed system includes a CT scanner 12 which examines a subject 14, and generates data from the examination. Column 5, lines 35-39. *All* of the data is then stored in a volume image data

memory 20. Column 5, lines 39-40. After the data has been sampled and saved in memory, a three-dimensional view may be graphically rendered from these two-dimensional images by means of a sequence generating computer 22, which includes a frame rendering processor 74, an image memory access processor 76, and a ray projection processor 78. Column 5, lines 40-43; column 6, lines 60-66. Three-dimensional views are constructed by first creating, from the stored data, a sequence of two-dimensional source images 170, which are then cropped and curved into a generally spherical shape, representing a panoramic first-person perspective. Column 8, line 49 – column 9, line 22.

Iyriboz et al. do not disclose asymmetric imaging or cropping such an image.

In rejecting claim 1, the Examiner continues to erroneously rely on column 10, lines 16-28, of the Iyriboz et al. reference as showing a method for “cropping an asymmetrical digital image” as recited in the claim. Applicants respectfully request that the Examiner consider the context of the cited passage within the teachings of the reference, taking particular notice of FIG. 6A and the passage cited below by Applicants. In fact, while the passage cited by the Examiner does relate to *general* cropping of images, reference to the preceding twenty lines makes clear that the partial images 238 that are cropped to form output image 242 are *square*. Column 9, line 65 – column 10, line 15. Because these images are square, and thus symmetric, the cropping of these symmetric images cannot be equated with “cropping an *asymmetric* digital image” (emphasis added) as recited by the instant claim. As the assertion by the Examiner appears to be directly opposed to the teachings of the Iyriboz et al. reference, Applicants respectfully request that the Examiner either a *reasonable* rationale for suggesting that these images are somehow asymmetric or withdraw this assertion.

Iyriboz et al. do not disclose identifying a projection of a radiation beam.

In the first Office Action, the Examiner cited several passages of the Iyriboz et al. reference as indicative of “identifying a projection of a radiation beam in an image plane” as recited in claim 1. However, as discussed in the previous Response, none of the

passages cited by the Examiner show a radiation beam, a projection of that beam in an image plane, or identification of such a projection. In accordance with the Applicants' characterization of the reference above, the cited passages of the reference disclose a frame rendering processor 74 or 182 that controls, among other things, a ray projection processor 78 or 184. This ray projection processor *calculates* a plurality of rays from a viewing plane through a three-dimensional array of stored image data. There is one ray calculated for each pixel of the viewing screen, which is "projected" orthogonally from the screen. *However, this is an entirely computational process. See column 6, line 60 – column 7, line 11; column 9, lines 15-22.* The rays referred to are not part of any radiation beam, but are rays in a purely mathematical sense: *a half-line extending from a point in space*. Further, because these rays are merely mathematical constructs having no physical form, these abstract rays cannot be projected onto an image plane. Additionally, the Examiner has failed to point out any portion of the reference in which "identification" occurs. For these reasons, the reference cannot fairly be characterized as disclosing the step of "identifying a projection of a radiation beam in an image plane" as recited by independent claim 1.

Unfortunately, the Examiner continues to erroneously rely on column 9, lines 23-30, of the Iyriboz et al. reference as somehow showing "identifying a projection of a radiation beam in an image plane" as recited by independent claim 1. Applicants appreciate that the passage refers to a "ray projector 184" and believe that this is the basis of the Examiner's mischaracterization of the reference. Col. 9, lines 26-30. However, as is indicated by the reference immediately prior to the cited passage and discussed above, this "ray projector 184" is actually a "ray projection processor 184 which *calculates* a plurality of rays from a viewing plane" (emphasis added). Col. 9, lines 14-18. In context, it is apparent that these rays are rays in the traditional mathematical sense. As the Examiner may appreciate, mere use of the word "ray" does not necessarily indicate an X-ray or radiation beam. The mathematical use of the word "ray" in the cited reference is entirely consistent with a three-dimensional rendering process and clearly does not suggest

a radiation beam as alleged by the Examiner. Because the passage does not even suggest a radiation beam, it necessarily fails to suggest a projection of a radiation beam, or the identification of such a projection, as recited by independent claim 1. Applicants respectfully request that the Examiner, after careful consideration of the reference, withdraw his assertions with respect to this passage.

Fabian does not disclose identifying an asymmetric projection of a radiation beam.

Even assuming for the sake of argument that the Iyriboz et al. reference did disclose identification of a projection of a radiation beam, the Examiner recognizes that the Iyriboz et al. reference fails to disclose any *asymmetrical* projection of a radiation beam. The Examiner relies upon the Fabian reference to overcome this deficiency. Applicants note that the Fabian reference is directed to marking radiographic film to prevent confusion in viewing the film. Col. 1, lines 14-17. As indicated by the reference and as would be appreciated by one skilled in the art, the human body is chirally symmetric in that the left side of the body is similar in appearance to the right side of the body. *See* col. 2, lines 49-56. In other words, the two sides are mirror images of each other. This symmetry can lead to confusion when viewing x-ray images of various parts of the body such as hands or feet. *See* col. 2, lines 56-60; *see also* FIGS. 2 and 3. In order to combat confusion and the incidence of clinical error, the Fabian reference discloses the use of a marker 40 that is developed on a radiographic film. *See, e.g.,* col. 4, lines 27-30; col. 5, lines 27-57; FIGS. 1-3. This marker 40 is chirally asymmetric or, i.e. the marker is not a mirror image of itself. Col. 5, lines 52-57. For instance, the letters "X," "I," and "O" are chirally symmetric in that they appear the same whether viewed from the front or the back. Conversely, chirally symmetric letters such as "F" or "L" are easily identified as reversed when viewed from the rear. Accordingly, the Fabian reference discloses placing a chirally asymmetric marker 40 on radiographic film to prevent confusion regarding the proper viewing side. The reference suggests using the letter "F" or the word "front" for this marker. Col. 5, lines 46-50; *see* FIGS. 1-3.

Although the reference does discuss chiral asymmetry of a film marker, the Fabian reference fails to disclose “identifying a *projection of a radiation beam* in an image plane, the *projection* being asymmetrical with respect to an axis of the image plane,” (emphasis added) as recited by independent claim 1. The passages on which the Examiner relies merely discuss the use of a chirally asymmetric marker on a film to prevent confusion. While the marker is asymmetric, the cited passages fail to suggest an asymmetrical *projection* of a radiation beam, which is distinguishable from the marker itself. Because the chirally asymmetric marker 40 is not logically equivalent to a projection of a radiation beam, Applicants respectfully request withdrawal of the Examiner’s assertion to the contrary.

Iyriboz et al. fail to disclose processing image data based on the identified projection.

The Iyriboz et al. reference also fails to disclose “processing image data for a portion of a digital detector *based upon the identified projection*” (emphasis added) as recited by independent claim 1. As discussed immediately above, the reference does not identify a projection of a radiation beam in an image plane at all. Consequently, it is not possible for the reference to disclose the processing of image data *based upon the identified projection*.

In the Office Action mailed December 28, 2004, the Examiner again asserted that column 5, lines 55-57, of the Iyriboz et al. reference discloses “processing image data for a portion of a digital detector *based upon the identified projection*” (emphasis added). However, this passage merely indicates that radiation receiving means, such as radiation detectors 44, are known in the art. Applicants, however, are not asserting that they invented radiation detectors and the Examiner’s rationale for citing this passage is unclear. As discussed above, the Iyriboz et al. reference fails to teach identifying a projection. Consequently, the reference cannot disclose processing data based upon an identified

projection. Applicants respectfully request that the Examiner provide a supporting rationale for this assertion or that the assertion be withdrawn.

Omitted Features of Independent Claims 11 and 21

With respect to independent claims 11 and 21 of the present application, Applicants respectfully disagree that the portions of the Iyriboz et al. and Fabian references cited by the Examiner disclose the recited features of claims 11 and 21. Several examples of the failure of these references to disclose the subject matter of the claims are given below.

Iyriboz et al. and Fabian do not disclose computing an image area.

For instance, neither reference discloses “computing an image area over which the beam impinges the plane” as recited by independent claims 11 and 21. The Examiner cites column 5, lines 50-64, of the Iyriboz et al. reference as satisfying this element, but this passage merely indicates that radiation detectors 44 are positioned to measure radiation directed toward the same detectors. The reference only discloses the measurement of radiation by the detectors 44 and the storing of all data received in a volume image data memory 20; it *does not* indicate any means for computing an image area over which the beam impinges the plane.

In responding to a similar argument made by Applicants in the last Response, the Examiner argued that Iyriboz et al. disclose “the radiation impinging.” *See* Official Action mailed December 28, 2004, pg. 3. However, merely showing that the reference teaches radiation that impinges some surface *is not responsive to Applicants’ argument*. Independent claims 11 and 21 clearly recite “*computing an image area* over which the beam impinges the plane” (emphasis added). As neither the Iyriboz et al. nor Fabian references disclose “computing an image area” in any manner, Applicants respectfully request withdrawal of the present rejection.

The cited references fail to disclose orienting a radiation beam for asymmetrical imaging.

Further, neither reference discloses orienting a radiation beam or assembly to project a beam “towards an image plane to impinge the plane asymmetrically with respect to an axis of the plane,” as recited by claims 11 and 21. The Examiner again relies on the Fabian reference as showing this asymmetrical impingement. As discussed fully above, the only discussion of asymmetry in the Fabian reference is with respect to the film marker 40, which cannot be reasonably equated with a *radiation beam* that is projected toward an image plane *to impinge the plane asymmetrically*. Because the passages relied upon by the Examiner fail to disclose asymmetrical impingement of an imaging surface, the references cannot teach orienting a radiation beam or assembly to project a beam “towards an image plane *to impinge the plane asymmetrically* with respect to an axis of the plane,” (emphasis added) as recited by claims 11 and 21. As such, the cited passages of the Fabian reference do not support a *prima facie* case of obviousness.

Fabian does not disclose sensing orientation of the radiation beam assembly.

Additionally, neither Iyriboz et al. nor Fabian disclose a method that includes the step of “sensing orientation of the radiation beam producing assembly” as recited in claim 21. The Examiner relies on the Fabian reference as disclosing this element. Particularly, the Examiner cites col. 4, lines 27-46, in support of his contention. Applicants have carefully reviewed the passage and the reference as a whole. As discussed above, this passage of the Fabian reference discloses the use of a chirally asymmetric marker on radiographic film. Applicants also readily concede that the passage discusses the orientation *of the marker*. See col. 4, lines 35-39. However, the passage cannot be reasonably interpreted as disclosing “sensing orientation of the radiation beam producing assembly” as recited in the instant claim. Indeed, the passage fails to mention a radiation beam producing assembly at all, and it is thus impossible for the passage to disclose “sensing orientation of the radiation beam producing assembly.”

Omitted Features of Independent Claim 30

As for independent claim 30, the Examiner stated that the rejection analysis is the same as that for independent claim 21. Claim 30 is thus also believed patentable over the cited references for the same reasons that apply to claim 21 above. Applicants further assert, however, that the Iyriboz et al. and Fabian references also fail to fully disclose the subject matter of independent claim 30. For example, the references do not disclose a radiation source assembly that is "orientable with respect to an imaging plane to produce an asymmetrical image area," as recited by claim 30. The references never mention an "asymmetrical image area." As indicated above, the only discussion of asymmetry in the Fabian reference is with respect to the film marker 40. Similarly, the reference fails to anticipate a control circuit to process image data from the detector "*to the exclusion of* data from portions of the imaging surface outside the image area," (emphasis added) as recited by claim 30.


In view of the remarks set forth above, Applicants respectfully submit that independent claims 1, 11, 21, and 30 are patentable over the Iyriboz et al. and Fabian references. The Examiner also rejected dependent claims 2, 9, 10, 12, 13, 16-18, 27-29, 34, and 35 on the basis of these two references. Further, the Examiner rejected dependent claims 3-8, 14, 15, 19, 20, 22-26, 31-33, and 36 on the basis of these two references combined with the Deckman et al. reference. However, the Deckman et al. reference does nothing to obviate the deficiencies of the two references as discussed above. Consequently, all of these dependent claims are believed allowable by virtue of their dependency on their respective allowable base claim, as well as for the subject matter recited in these claims. Accordingly, Applicants respectfully request withdrawal of the Examiner's rejections and allowance of claims 1-36.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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